

## Finisar Compatible FTLC9152RGPL-FL Quick Spec:

Part Number:	FTLC9152RGPL-FL FTLC9152RGPL-EXT-FL FTLC9152RGPL-IND-FL
Form Factor:	QSFP28
TX Wavelength:	SWDM4
Reach:	150m
Cable Type:	OM4 MMF
Rate Category:	100GBase
Interface Type:	SWDM4
DDM:	Yes
Connector Type:	Dual-LC



## Finisar Compatible FTLC9152RGPL-FL Features:

- Compliant with QSFP28 MSA
- Compliant with SWDM MSA
- Supports 103 Gbps aggregate bit rate
- Up to 150m reach for OM5 MMF
- Single +3.3V power supply
- Transmitter: 4x25Gb/s 850nm VCSEL-based (850nm, 880nm, 910nm, 940nm)
- Receiver: 4x25 Gb/s PIN ROSA
- 4x25 Gb/s Compliant with IEEE802.3bm CAUI-4
- Maximum power consumption 3.5W
- RoHS-6 compliant (lead-free)
- Duplex LC receptacle
- I<sup>2</sup>C interface with integrated Digital Diagnostic Monitoring
- Operating Case Temperature
  - Standard: 0°C to +70 °C
  - Extended -5°C to +85 °C
  - Industrial -40°C to +85 °C

## Finisar Compatible FTLC9152RGPL-FL Applications:

- 100G Ethernet links

## Finisar Compatible FTLC9152RGPL-FL Overview

The 100G QSFP28 SWDM4 transceiver modules are designed for use in 100G Ethernet links over duplex multimode fiber. Four channels/lanes in the 850-940nm region @ 25.78Gbps to transport the Ethernet signal. Digital diagnostics functions are available via an I2C interface, as specified by the QSFP28 MSA.

## Specifications:

### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	$T_s$	-40	+85	°C
Operating Case Temp (Standard)	TOP	0	70	°C
Operating Case Temp (Industrial)	TOP	-40	85	°C
Power Supply Voltage	Vcc	-0.5	3.6	V
Relative Humidity (non-condensation)	RH	5	85	%

### Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Power Supply Voltage	Vcc	3.135	3.465	V
Power Consumption	P		3.5	W
Link Distance on OM3 MMF			75	m
Link Distance on OM3 MMF			100	m
Link Distance on OM3 MMF			150	m

### Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Power Consumption	-			4.5	W
Supply Current	Icc			1.21	A

### Electrical Characteristics – Transmitter (each lane)

Parameter	Min	Typ	Max	Unit
Signaling rate per lane (range)	25.78125 ±100 ppm			GBd
Differential input return loss	Equation (83E-5)			dB
Differential to common mode input return loss	Equation (83E-6)			dB
Differential termination mismatch			10	%
Module stressed input test	See 83E3.4.1			
Differential pk-pk input voltage tolerance	900			mV
DC common mode voltage	-350		2850	mV
Single ended voltage tolerance range	-0.4		3.3	V

### Electrical Characteristics-Receiver

Parameter	Min	Typ	Max	Unit
Signaling rate per lane (range)	25.78125 ±100 ppm			GBd
Differential Output Impedance	85	100	115	ohm
AC common-mode output voltage (RMS)			17.5	mV
Differential output voltage			900	mV
Eye width	0.57			UI
Eye height, differential	228			mV
Vertical eye closure			5.5	dB
Differential output return loss	Equation (83E-2)			dB
Common to differential mode conversion return loss	Equation (83E-3)			dB
Differential termination mismatch			10	%
Transition time (20% to 80%)	12			ps
DC common mode voltage	-350		2850	mV

## Optical Characteristics-Transmitter

Parameter	Lane	Min	Typ	Max	Unit	Notes
Signaling Speed per Lane		25.78125±100ppm			Gbps	
Lane Wavelength Range	Lane0 Lane1 Lane2 Lane3	844 874 904 934		858 888 918 948	nm	
Modulation Format		NRZ				
Difference in launch power between any two lanes				4.5	dBm	
RMS Spectral width				0.59	nm	1
Optical Modulation Amplitude (OMA), each lane		-5.5		3	dBm	2
Average Launch Power per Lane @ TX Off State				-30	dBm	
Launch Power in OMA minus TDEC	Lane0 Lane1 Lane2 Lane3	-7 -7 -7.4 -7.7			dBm	
Transmitter and Dispersion Eye Closure	Lane0 Lane1 Lane2 Lane3			4 4 4.4 4.8	dB	3
Extinction Ratio		2			dB	
Optical Return Loss Tolerance				12	dB	
Encircled Flux		≥86% at 19 um ≤30% at 4.5 um				4
Transmitter eye mask definition {X1, X2, X3, Y1, Y2 Y3} Hit ratio 1.5x10 <sup>-3</sup> hits per sample		{0.3,0.38,0.45,0.35,0.41,0.5}				

Notes:

1. RMS spectral width is the standard deviation of the spectrum.
2. The normative lowest value of OMA for a compliant transmitter is 'Launch power in OMA minus TDEC, each lane (min)' plus the actual value of 'TDEC', but with a value of at least 'OMA, each lane (min)'.
3. TDEC is calculated from the measured TDECm using the methods in 3.6. TDECm is measured following the method in IEEE 802.3 clause 95.8.5 using a 12.6 GHz bandwidth reference receiver for all lanes. If measured into type A1a.2 or type A1a.3 50 um fiber in accordance with IEC 61280-1-4.

## Optical Characteristics-Receiver

Parameter	Lane	Min	Typ	Max	Unit	Notes
Signaling Speed per Lane		25.78125±100ppm			Gbps	
Lane Wavelength Range	Lane0 Lane1 Lane2 Lane3	844 874 904 934		858 888 918 948	nm	
Modulation Format		NRZ				
Damage Threshold		4.4			dBm	
Avg. Receive Pwr, each lane	Lane0 Lane1 Lane2 Lane3	-9.5 -9.4 -9.4 -9.4		3.4	dBm	
Receiver Power, each lane (OMA)				3	dBm	
Receiver Reflectance				-12	dB	
unStressed Receiver Sensitivity(OMA)	Lane0 Lane1 Lane2 Lane3			-8.2 -8.4 -8.6 -8.8	dBm	1
RX_Los_Assert		-30			dBm	
RX_Los_De-ASSERT				-12	dBm	
RX_Los_Hysteresis		0.5			dBm	

Notes:

1. unstressed sensitivity at BER of 5E-5 (pre FEC)

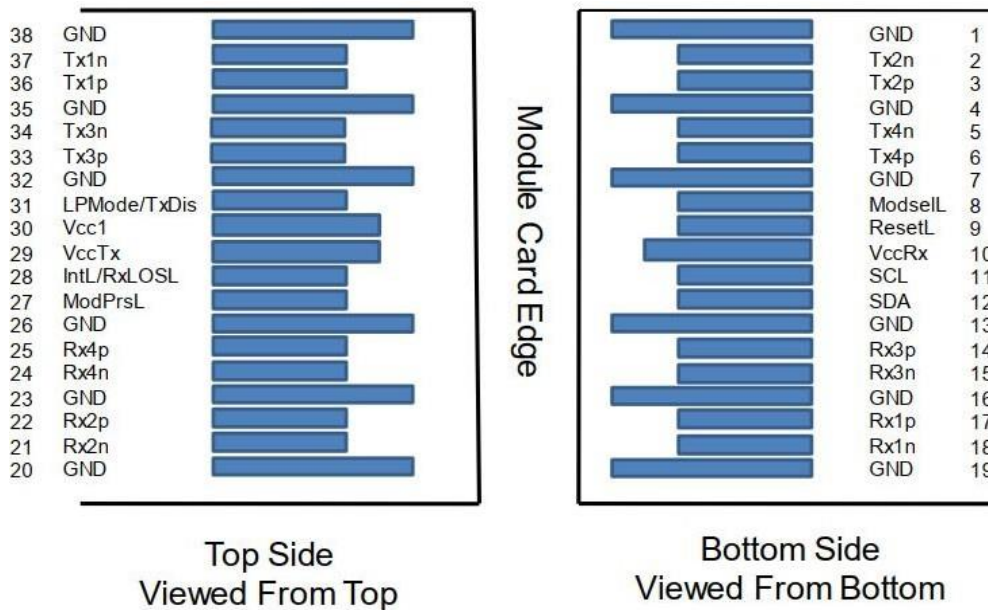
## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

Parameter	Unit	Specification
Temperature Monitor	°C	±3
Voltage Monitor	V	±5%
I_bias Monitor	mA	±10%
Received Power (Rx) Monitor	dB	±3.0
Transmit Power (Tx) Monitor	dB	±3.0

## PIN Assignment and Function Definitions

The electrical interface to the transceiver is a 38 pins edge connector. The 38 pins provide high speed data, low speed monitoring and control signals, I2C communication, power and ground connectivity. The top and bottom views of the connector are provided below, as well as a table outlining the contact numbering, symbol and full description.



## PIN Definition

PIN	Signal Name	Description
1	GND	Ground (1)
2	Tx2n	CML-I Transmitter 2 Inverted Data Input
3	Tx2p	CML-I Transmitter 2 Non-Inverted Data Input
4	GND	Ground (1)
5	Tx4n	CML-I Transmitter 4 Inverted Data Input
6	Tx4p	CML-I Transmitter 4 Non-Inverted Data Input
7	GND	Ground (1)
8	ModSelL	LVTTLL-I Module Select
9	ResetL	LVTTLL-I Module Reset
10	VCCRx	+3.3V Power Supply Receiver (2)
11	SCL	LVCNOS-I/O 2-Wire Serial Interface Clock
12	SDA	LVCNOS-I/O 2-Wire Serial Interface Data
13	GND	Ground (1)
14	Rx3p	CML-O Receiver 3 Non-Inverted Data Output
15	Rx3n	CML-O Receiver 3 Inverted Data Output
16	GND	Ground (1)
17	Rx1p	CML-O Receiver 1 Non-Inverted Data Output
18	Rx1n	CML-O Receiver 1 Inverted Data Output
19	GND	Ground (1)
20	GND	Ground (1)
21	Rx2n	CML-O Receiver 2 Inverted Data Output
22	Rx2p	CML-O Receiver 2 Non-Inverted Data Output
23	GND	Ground (1)
24	Rx4n	CML-O Receiver 4 Inverted Data Output
25	Rx4p	CML-O Receiver 4 Non-Inverted Data Output
26	GND	Ground (1)
27	ModPrsL	Module Present
28	IntL	Interrupt
29	VCCTx	+3.3V Power Supply Transmitter (2)
30	VCC1	+3.3V Power Supply
31	LPMODE	LVTTLL-I Low Power Mode
32	GND	Ground (1)
33	Tx3p	CML-I Transmitter 3 Non-Inverted Data Input
34	Tx3n	CML-I Transmitter 3 Inverted Data Input
35	GND	Ground (1)
36	Tx1p	CML-I Transmitter 1 Non-Inverted Data Input
37	Tx1n	CML-I Transmitter 1 Inverted Data Input
38	GND	Ground (1)

**Notes:**

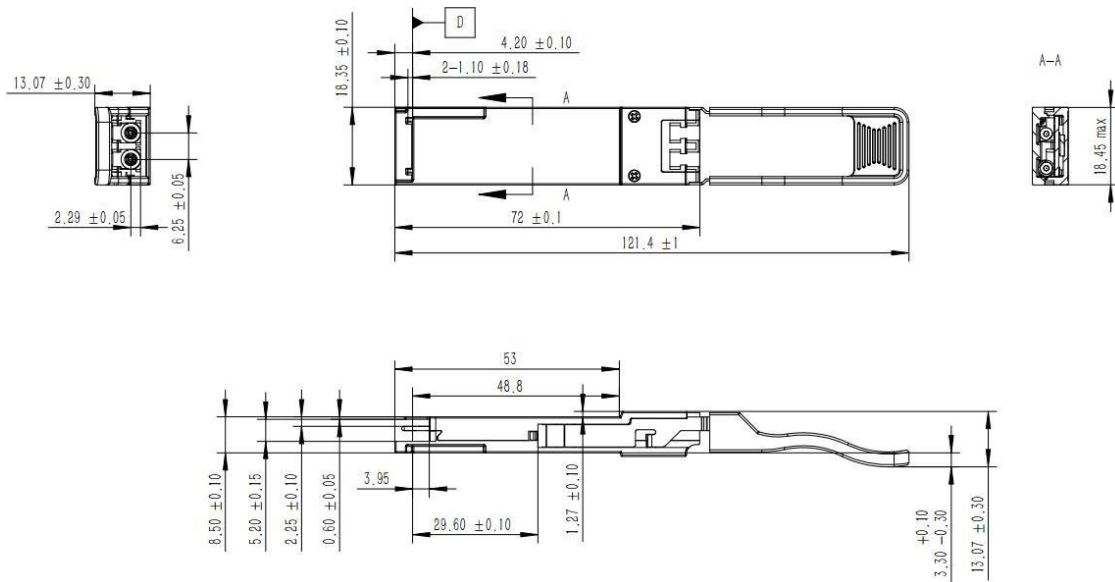
1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1 and VccTx are the receiving and transmission power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown below. Vcc Rx, Vcc1 and Vcc Tx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

**Memory Map**

Compatible with SFF-8836

**Mechanical Dimensions**

Pull tab color: Gray, Pantone 424U  
Unit: mm



**Licensing**

The following U.S. patents are licensed by Finisar to FluxLight, Inc.:  
U.S. Patent Nos: 7,184,668, 7,079,775, 6,957,021, 7,058,310, 6,952,531, 7,162,160, 7,050,720